

# JITF and API 96/97



# 2010 Energy Industry Response



Created 4 Joint Industry Task Forces:

- Prevention
  - **Operating Procedures Task Force**
  - **Equipment Task Force**
- Intervention
  - **Subsea Well Control and Containment Task Force**
- Spill Response
  - **Oil Spill Preparedness and Response Task Force**

## Restoring Confidence in Deepwater Drilling Operations



# Operating Procedures Task Force

- Focus on Drilling & Completion safety, design, procedures and operations associated Deepwater Wells
- JITF met ~2 weeks in May 2010 to develop recommendations for DOI focused on (5) areas:
  1. Cementing
  - 2. Loads and Resistance Deepwater Well Design Considerations**
  - 3. Fluid Displacement and Negative Testing**
  - 4. Abandonment and Barriers**
  - 5. Adopt Safety Case & Well Construction Interface**

# Objectives of JITF

- Make improvements
- Reduce risk
- Increase environmental protections
- Provide rationale for continued drilling in the Gulf of Mexico

# API Bulletin 97

## Well Construction Interface Document





# WCID Guidelines

## DOI May 27, 2010 Increased Safety Measure Report

### **Recommendation 2 – The Department Will Adopt Safety Case Requirements for Floating Drilling Operations on the OCS**

The Department will assure the adoption of appropriate safety case requirements based on IADC Health, Safety and Environmental Case Guidelines for Mobile Offshore Drilling Units (2009), which will include well construction safety assessment prior to approval of APD. This safety case must establish risk assessment and mitigation processes to manage a drilling contractor's controls related to the health, safety, and environmental aspects of their operations. In addition to the safety case, a separate bridging document will be required to connect the safety case to existing well design and construction documents. Such a proposed Well Construction Interfacing Document will include all of the elements in a conventional bridging document plus alignment of the drilling contractor's management of change (MOC) and risk assessment to the lease operator's MOC and well execution risk assessments. The use of the IADC's Health, Safety, and Environmental Case Guidelines for Mobile Offshore Drilling Units will help operators and drilling contractors demonstrate their ability to operate safely and handle the risks associated with drilling on the OCS.

# API Bulletin 97

- Initial Plan (mid 2010)

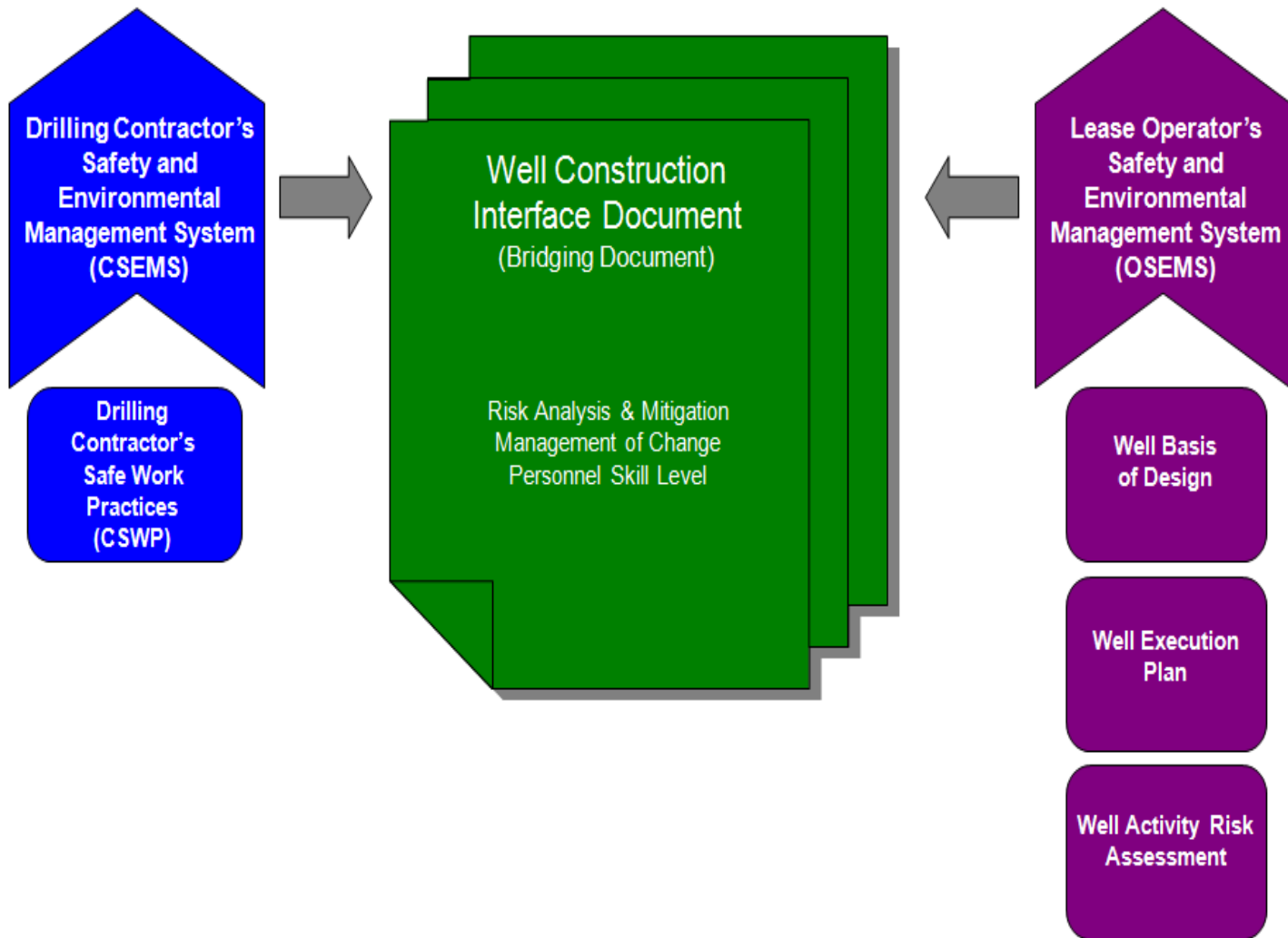
- **Safety Case** to link Contractors HSE case with Operators Safety Management System (SMS) (as alluded to in Buffalo report)
  - European Safety Case Regime for Gulf Of Mexico
  - WCID would be part of the APD process



# Revisions

- Further meetings with BOEMRE 4<sup>th</sup> Qtr 2010 indicated different outcome
  - **Safety Environment Management System** (SEMS) by operator with full accountability on operator
  - WCID not integral to APD process
  - **Will be interface (bridging document) between operator and Rig Contractor and other Contractors. Focus on well design, execution plans, chain of command and Operator SEMS interface with Contractor**

# Scope



# RP Bulletin 97 WCID Contents

- WCID Guidelines
  - Drilling Contractor/Operator SEMS Interface
  - Well Construction (geology, design, barriers, execution, risk analysis etc)
- WCID SEMS Interface Example
- WCID Well Construction Interface Example with Risk analysis example

# 2011 Results

- Refined Bulletin 97 and the WCID  
Example annexes to go to ballot
  - Removed references to permitting process and Registered Engineers
  - Removed references to equipment certifications
  - Removed safety case references.
- Ballot Bulletin 97 1<sup>st</sup> Edition—August
- Results received in October
  - 15 affirmative votes / 4 negative votes
  - reviewing several hundred comments

Proactive use of WCID will  
improve safety and compliance  
with SEMS

# **RP 96 Deepwater Well Design and Construction**

- API (Gary Luquette and David Payne) committed to 2<sup>nd</sup> phase of JITF Operating Procedures for “new standards for DW well designs”. June 2010
- WG composed of operators, rig contractors, service companies, industry associations and government regulators

# RP 96 Description

- Reviews Deepwater rig systems and BOPs (to show how rigs affect well design)
- Examples of current DW GOM well architecture, and Barrier Philosophy (7 pages)
- Defines load cases (internal and external pressures) and reviews survival design considerations
- Special considerations for drilling and completions

# RP 96 description (Cont)

- Extensive review and examples for conducting displacement operations during drilling and completion operations
- Review of management of change, including Stop Work Authority
- 3 annexes provide examples for barriers employed during several operations, barrier definitions and examples for negative testing (53 pages total)

# API RP 96 “**Deepwater Well Design and Construction**” Status

- Sent out for re-ballot late October 2010 after addressing over 1100 comments following original ballot
- Document intent (per original JITF)
  - Outline barrier and load case considerations
  - Supplement API RP 65-2 (and 90 for APB)
  - Discuss design features and risks for various scenarios to prevent loss of well control

# RP 96 Conclusions

- RP 96 is not meant to be a text book for new engineers or drilling engineers new to Deep Water. It will not define what design factor to use for burst, for example.
- It is designed to demonstrate and give examples of casing loads, items to consider when designing wells, and examples of different well design considerations and design rationale.
- It gives multiple examples (but is not intended to cover all cases) for considerations when displacing wells and performing negative tests.
- It provides detailed definitions for barriers.
- It reviews operational considerations for drilling and completions, such as open water work, well testing and more.
- Special operational considerations such as landing strings, APB, Intelligent Wells

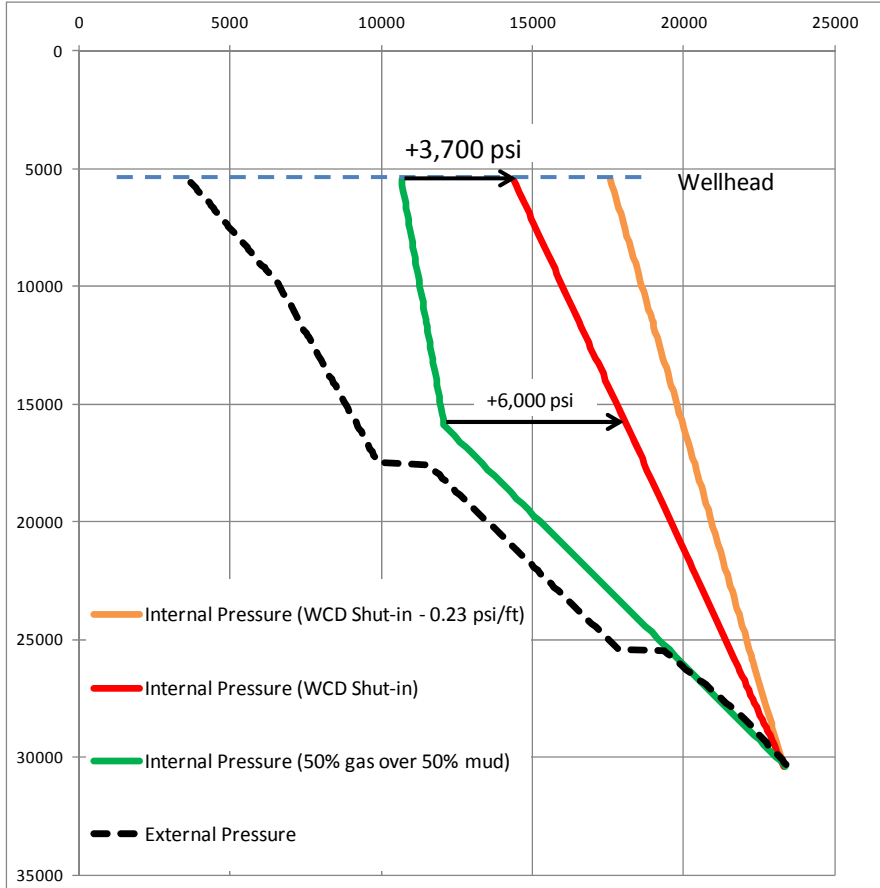


# Well design to meet permitting requirements

## Well Containment Screening Tool

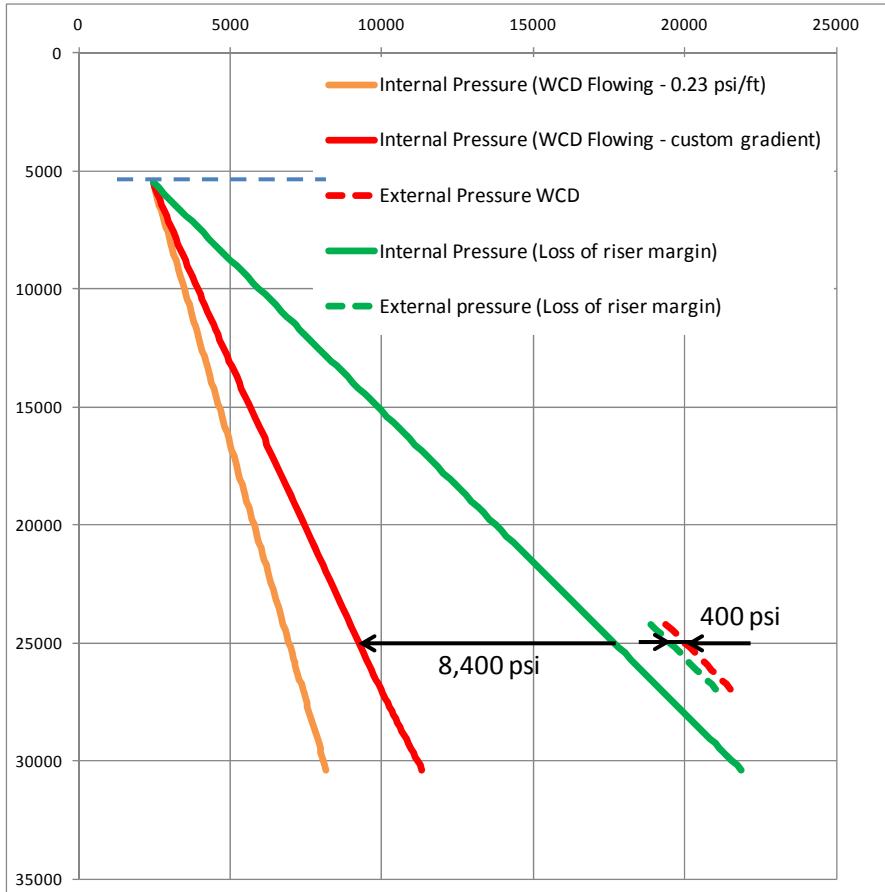
- Introduction – BOEMRE requirements (NTL-10)
- Design considerations to demonstrate containment capability
- Load cases for containment evaluation
- Examples of changes to well design
- Well Containment Screening tools – Level 1 & Level 2
- Version 19 is nearing completion, Cap and Flow

# Drilling Burst design – Full shut-in



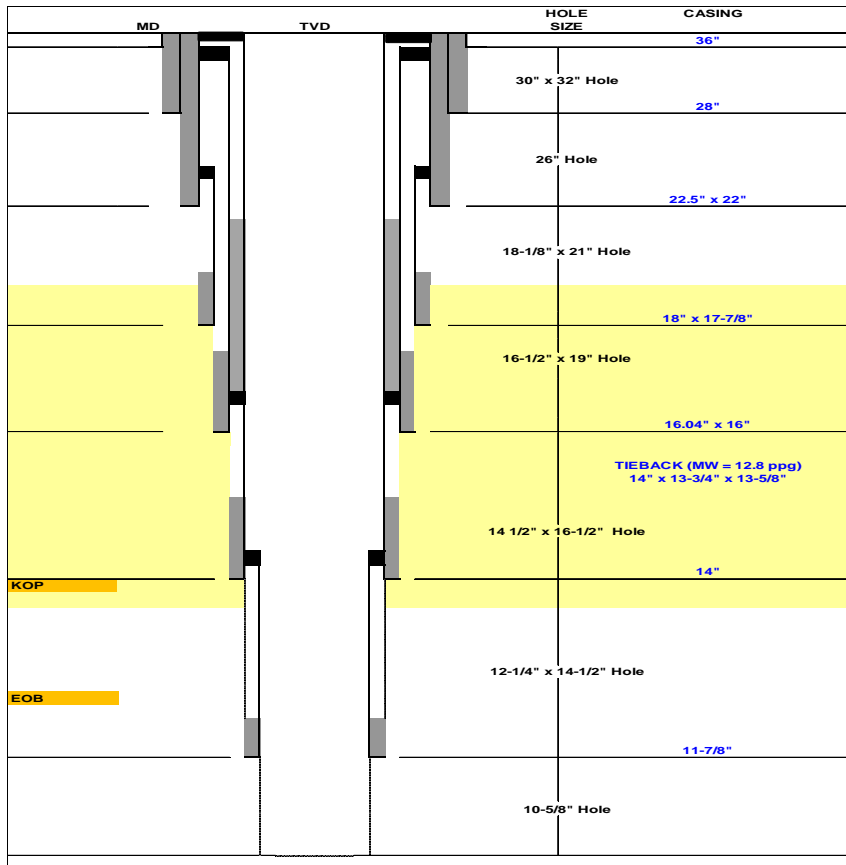
- Before NTL-10
  - Usually, worst case for drilling = Formation pressure at TD with top half (TVD) of well displaced to gas and lower half (TVD) filled with mud
- After NTL10
  - Internal pressure = reservoir pressure with full column of hydrocarbons above
  - Sensitive to fluid gradient
- Example: burst load increase
  - 3,700 psi at wellhead
  - 6,000 psi at ~16,000'
- Pressure on exposed formation increases (increased risk for fracture)
- Burst loads usually increase towards the mudline

# Drilling Collapse design



- Before NTL-10
  - Usually, worst case for drilling = **Loss of riser margin or mud drop due to downhole losses**
- After NTL10
  - **Internal pressure = seawater hydrostatic at mudline with flowing hydrocarbon gradient below**
    - Sensitive to produced fluid gradient
  - **Increased APB due to hydrocarbon flow**
- Example: collapse load increase
  - 8,800 psi at 25,000'
    - 8,400 psi due to Internal Pressure decrease
    - 400 psi due to APB increase
- Collapse load increases with depth

# Examples of changes to well design



- Burst (typically changes to upper half of well)
  - Tieback (14", 13-3/4", 13-5/8")
  - Use 16.04", 16.15" instead of 16"
  - Higher rating (submudline) hangers
  - Or resolve with Cap & Flow
- Collapse (typically changes to lower half of well)
  - Use heavier 16.04", 16.15" instead of 16"
  - Use heavier 14" instead of 13-5/8"
  - Higher rating 14" hanger systems
  - Use long string to control APB (weight limited)
  - Lower liners collapse (11-7/8" and smaller)
- Formation strength (broaching)
  - Move mechanical failure point deeper
  - Change casing setting depths to take advantage of strong formation (e.g., salt) or weak/thief zones
  - Or resolve with Cap & Flow
- Using existing pre-NTL10 wells may be challenging
  - More complicated solutions, e.g., scab liners

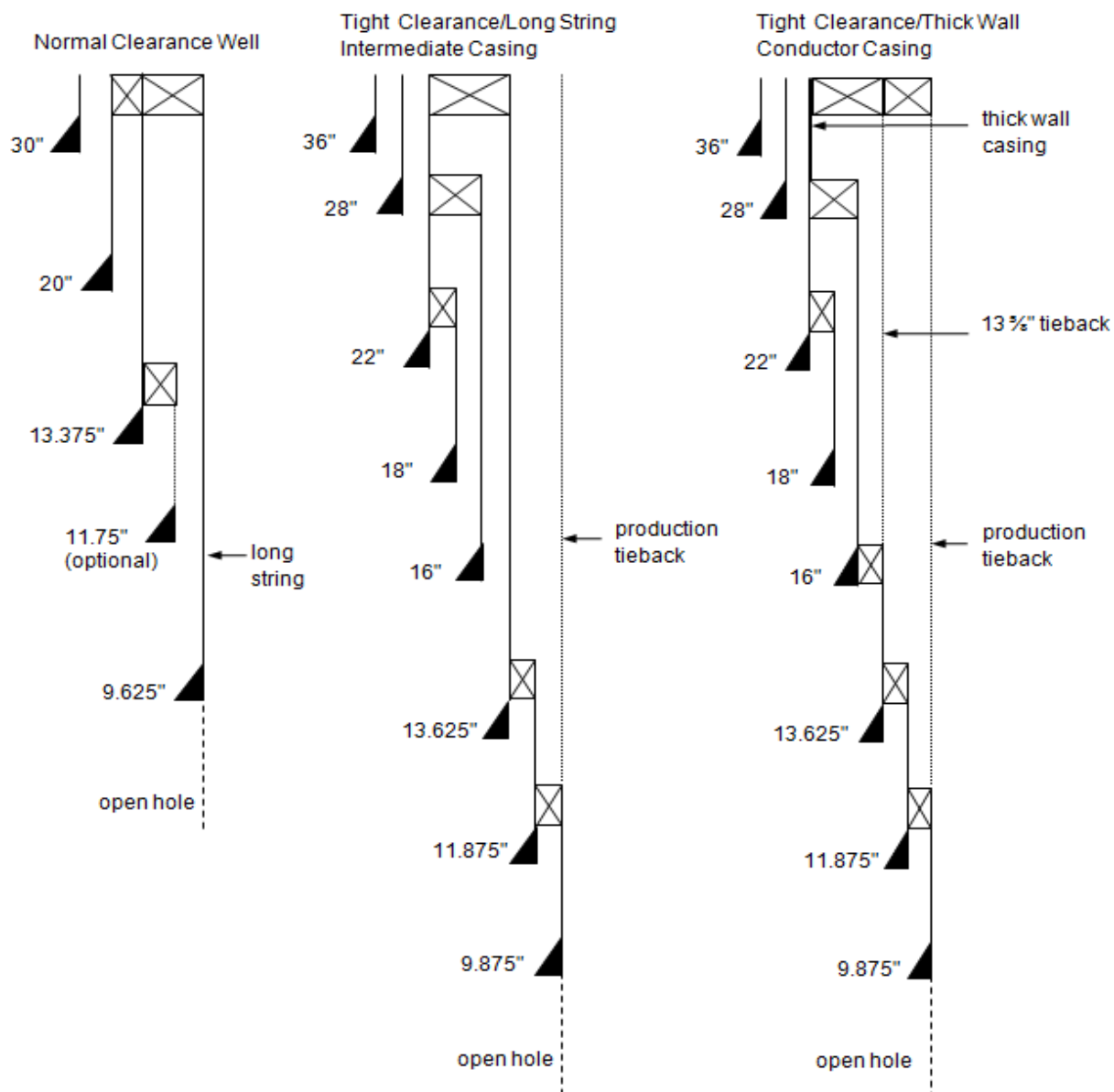
# Blowout Risk Assessment JIP (BORA)

- To develop a rapid risk assessment tool to evaluate the risk related to well design and operations in the Gulf of Mexico. The risk assessment tool will incorporate three key areas:
  - Design and Planning
  - Execution (in the field)
  - Containment (source control and collection)
- A comparative risk assessment (CRA) will be developed to help provide a reference point to measure levels of risk.

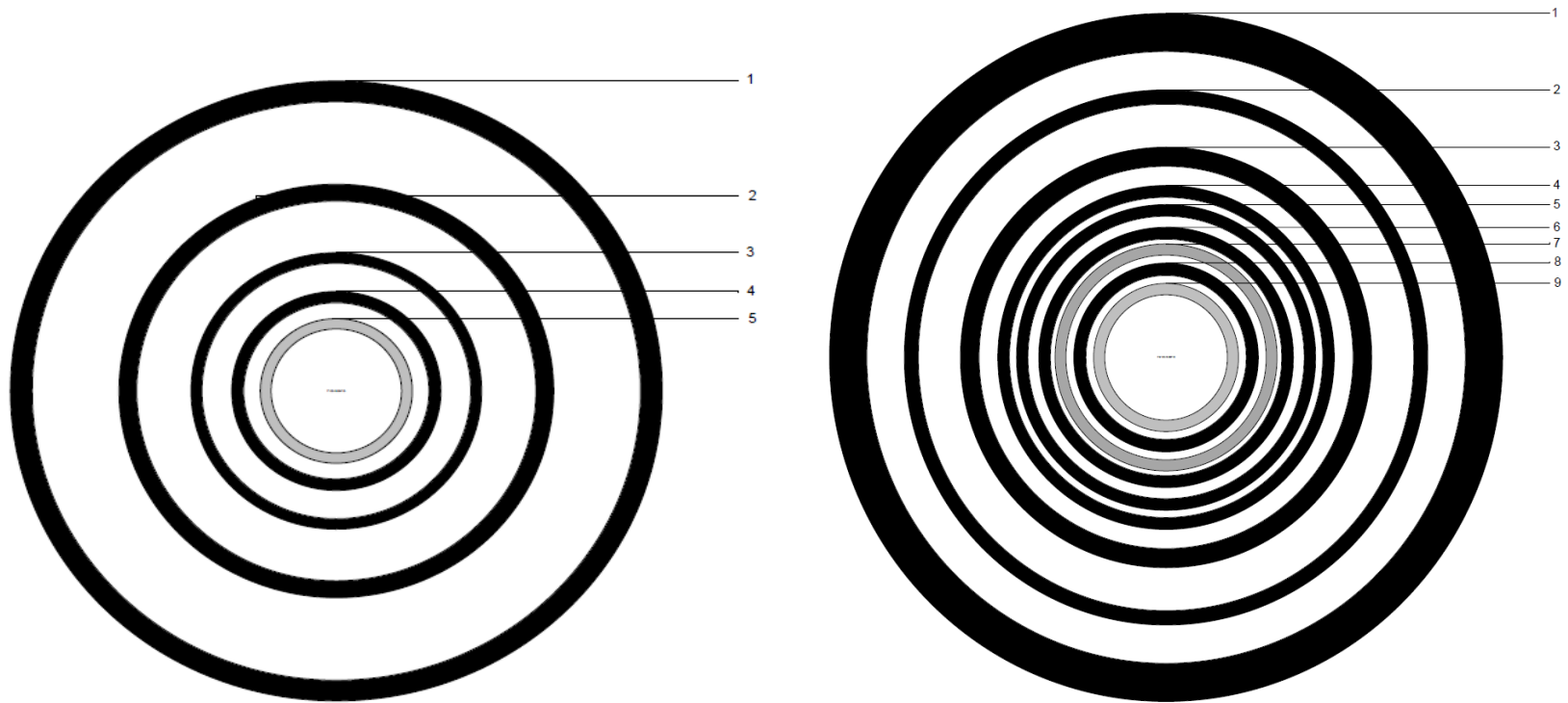
Thirteen companies have committed to fund this JIP (Nov 1)  
Similar approach to that used to assess risk for anchored rigs

# JITF Summary

- Provided input to DOI's 30-day Safety Report
- Included recommendation for Incorporation by Reference of API Recommended Practice on Cementing (RP 65-2)
- Proposal for a new API Recommended Practice on Deepwater Well Design Construction (RP 96)
- Proposal for developing a Well Construction Interface Document to align safety programs (Bulletin 97) – Joint with IADC
- Provide comments to DOI on Interim Final Drilling Rule



# Comparison of 1990s casing design to current deep well design



# Barrier Verification

